Army DLMS Migration Strategy
September 1, 2004

LMI
GOVERNMENT CONSULTING

THE OPPORTUNITY TO MAKE A DIFFERENCE HAS NEVER BEEN GREATER

Objective

To assist the Army in developing a DLMS migration strategy that best positions Army to integrate DLMS with current and planned IT initiatives and architectures

Agenda

- Background
- Key Migration Alternatives
  - Syntax
    - ASC X12 EDI
    - XML
  - Content
    - DLMS Interim XML
    - CICA Based XML
    - ISO Based XML
  - Scope
  - Architecture
- Recommendations

OSD Memorandum on DLMS Migration

- *"Effective by close-of-business December 31, 2004, MILS formatted messages shall no longer be used within or between DoD systems*

- *Effective January 1 2005, all information systems shall use the DLMS ANSI ASC X12 or equivalent XML schema for all business processes supported by the DoD 400.25 series of manuals."*

Memorandum from Michael W. Wynne, DUSD AT&L. December 22, 2003. Subject: Migration to the Defense Logistics Management Standards (DLMS) and Elimination of the Military Standard Systems (MILS)

The Opportunity

The release of the DLMS memorandum, combined with multiple ERP adoptions, opens a window of opportunity to achieve a paradigm shift in defense logistics systems and data capabilities that is unlike any opportunity in the past 30 years – or likely to exist again in the near future.

LMI Experience

- DLMS and Logistics
  - 1961 - present: Support DoD logistics
  - 1987: Completed MILS alternatives analysis and recommended X12 to DLMSO
  - 1987 - 1996: Assisted DLMSO and worked with ASC X12 to develop DLMS
  - 1996: Wrote DLMS implementation strategy
  - 1997 - present: Assist DLMSO with incorporating S/A unique transactions
- EDI & XML Experience
  - Recommended EDI adoption in 1985 and XML in 1998
  - Have nearly a dozen trained staff actively working on XML
  - XML clients include:
    - GSA, EPA, SBA, Treasury, US TRANSCOM, and DON
    - OTA and PIDX
  - Participated and held leadership positions in voluntary consensus standards (VCS) bodies for almost 20 years

LMI Standards Involvement

- ANSI ASC X12
  - Member: X12C, X12G, X12F, X12H, X12I, COTG
  - Past Vice-Chair: X12 XML WG
- ebXML
  - Member: Requirements, Architecture, Core Components
  - Editor: Requirements, Core Components
  - Chair: X12-UN/CEFACT, Joint ebXML, Core Components
- ISO
  - Member – TSC 154
- OASIS
  - UBL
    - Vice Chair: Universal Business Language TC
    - Chair: UBL XML NDR Subcommittee
  - Member: UBL, ebXML Registry, UDDI, Architecture, Security
- UN/CEFACT
  - Member: Steering Group, Material Management, Procurement, Finance working groups, Technical Assessment, Harmonization
  - Chair: XML Working Group
- W3C
  - Member - Advisory Committee, XML Digital Security

How Did We Get Here?
DoD Logistics Data Standards Evolution

	1960's	1996	2000-2004	2008-2015
Data	DLSS (MILS)	DLMS	DLMS	DLMS
Syntax	80 char. records	X12 EDI	X12 EDI or proprietary XML	X12 EDI or X12-CICA XML
Standards	DoD	ASC X12	ASC X12 or DoD	ASC X12
Architecture	AUTODIN DAAS hub	NIPRNET DAAS hub	NIPRNET DAAS hub	GIG DAAS hub
S/A Systems	Flat-file based	Relational DBMS	ERP	ERP
	Stove-piped systems	Stove-piped systems	Functionally aligned shared data; ERP environment	Enterprise shared data; net-centric environment

Changes in Alignment

- DLSS and S/A systems and architectures were once closely aligned, but have been diverging for many years
- Logistics and other functional area data were also once closely aligned, but have moved apart through different data architecture and management approaches
- Wide use of ERP systems is re-aligning where the data is stored, how it is shared, and the functions it supports
- In this new environment, key issues must be addressed. How do the ERP systems effect:
  - Future inter-S/A logistics architecture?
  - DLMS functionality?
  - DoD and DLMS data?

DLSS Background

- Defense Logistics Standard Systems (DLSS, or MILS)
- Established in the 1960's to automate and standardize inter-S/A logistics exchanges
  - Governance – DLMSO administers program and facilitates S/A requirements
  - Scope – Emphasizes supply. Includes very limited transportation, acquisition, or maintenance
  - Data & Business Rules – Defines data elements, attributes and the business processing rules
  - Syntax (format) – 80 character fixed length records with fixed position data
  - Architecture
    - Transaction based exchanges
    - AUTODIN – worldwide telecommunications backbone
    - DAAS – Established to Provide central hub and value added services
- By the 1980's the fixed-length records were inhibiting the ability of the DLSS to support new technical and functional initiatives.

DLMS Background

- DLMS – Defense Logistics Management System
- Published in 1996 (replaced DLSS)
  - Governance – DLMSO administers program and facilitates S/A requirements
  - Scope – Emphasizes supply. Includes very limited transportation, acquisition, or maintenance
  - Data & Business Rules – Defines data elements, attributes and the business processing rules. Includes enhancements
  - Syntax (format) Uses ANSI ASC X12 variable length EDI. XML alternative added several years later
  - Architecture
    - Transaction-based exchanges
    - NIPRNET – DISA's worldwide telecommunications backbone
    - DAAS – Provides central hub and value added services
    - Includes translation services between various formats – other organizations also translate

GCSSFos

- ***Joint Asset Visibility***
  - *Mobility, Transportation, Movement*
  - *Logistics (Supply, Maintenance, Engineering)*
  - *Personnel and Force Health Protection*
  - *Acquisition and Finance*
- ***Joint Decision Support Tools***
  - *Collaborative Planning*
  - *Course of Action Development*
  - *Course of Action Analysis*

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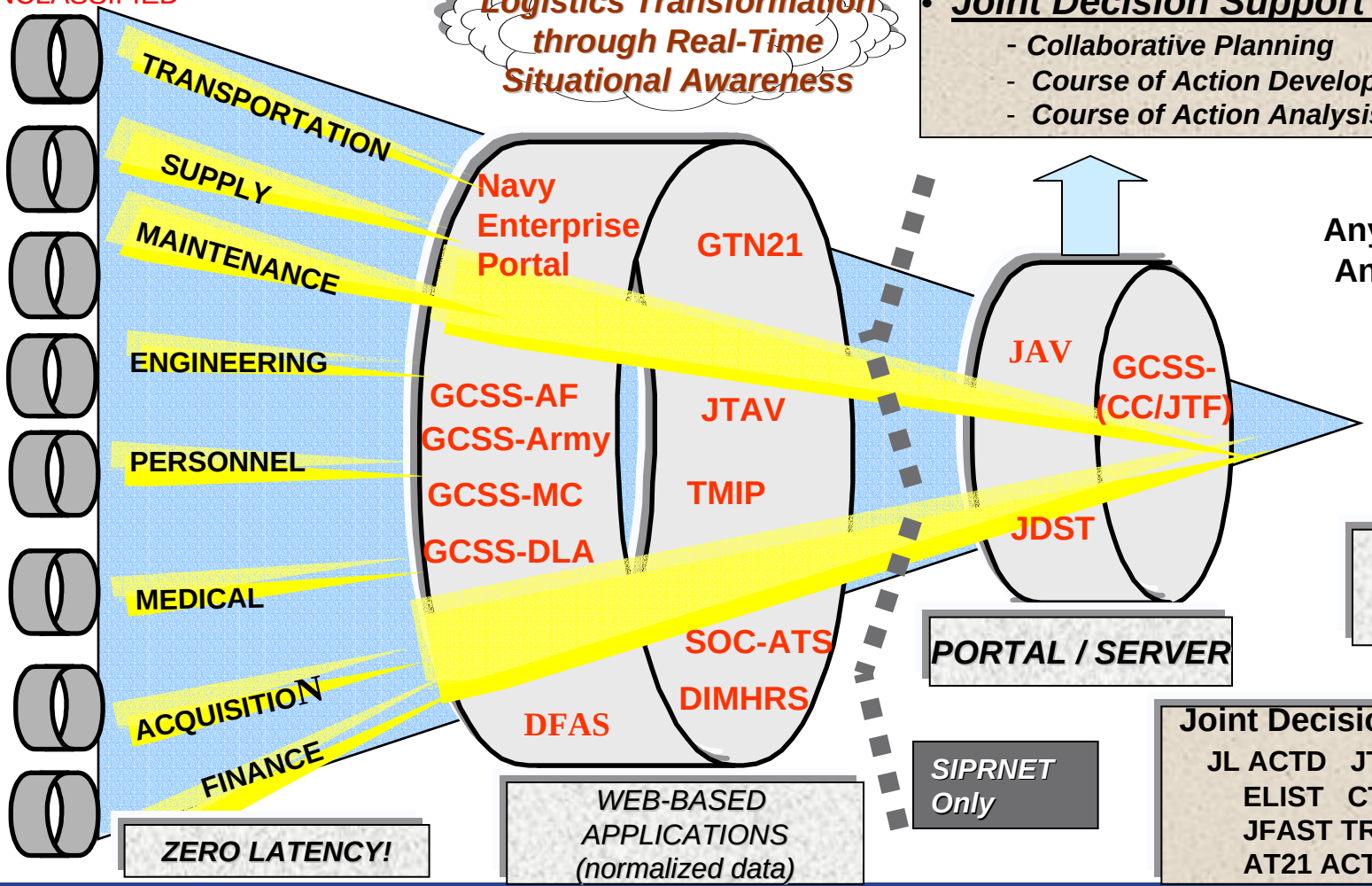
Logistics Transformation through Real-Time Situational Awareness



Joint Decision Support Tools:

JL ACTD JTL ACTD
ELIST CTL ACTD
JFAST TRANSCOP
AT21 ACTD

Agenda

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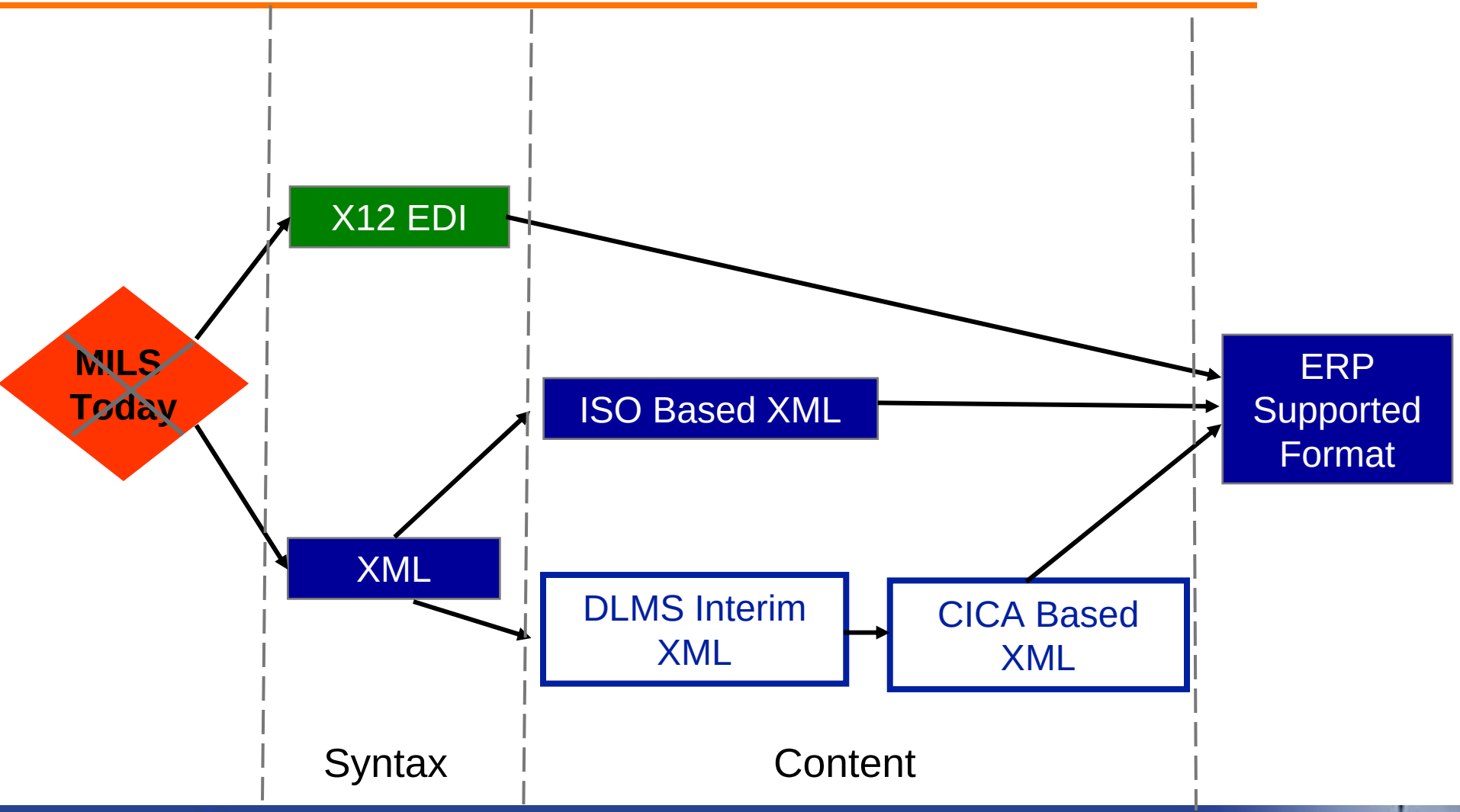
Army DLMS Migration Path Alternatives



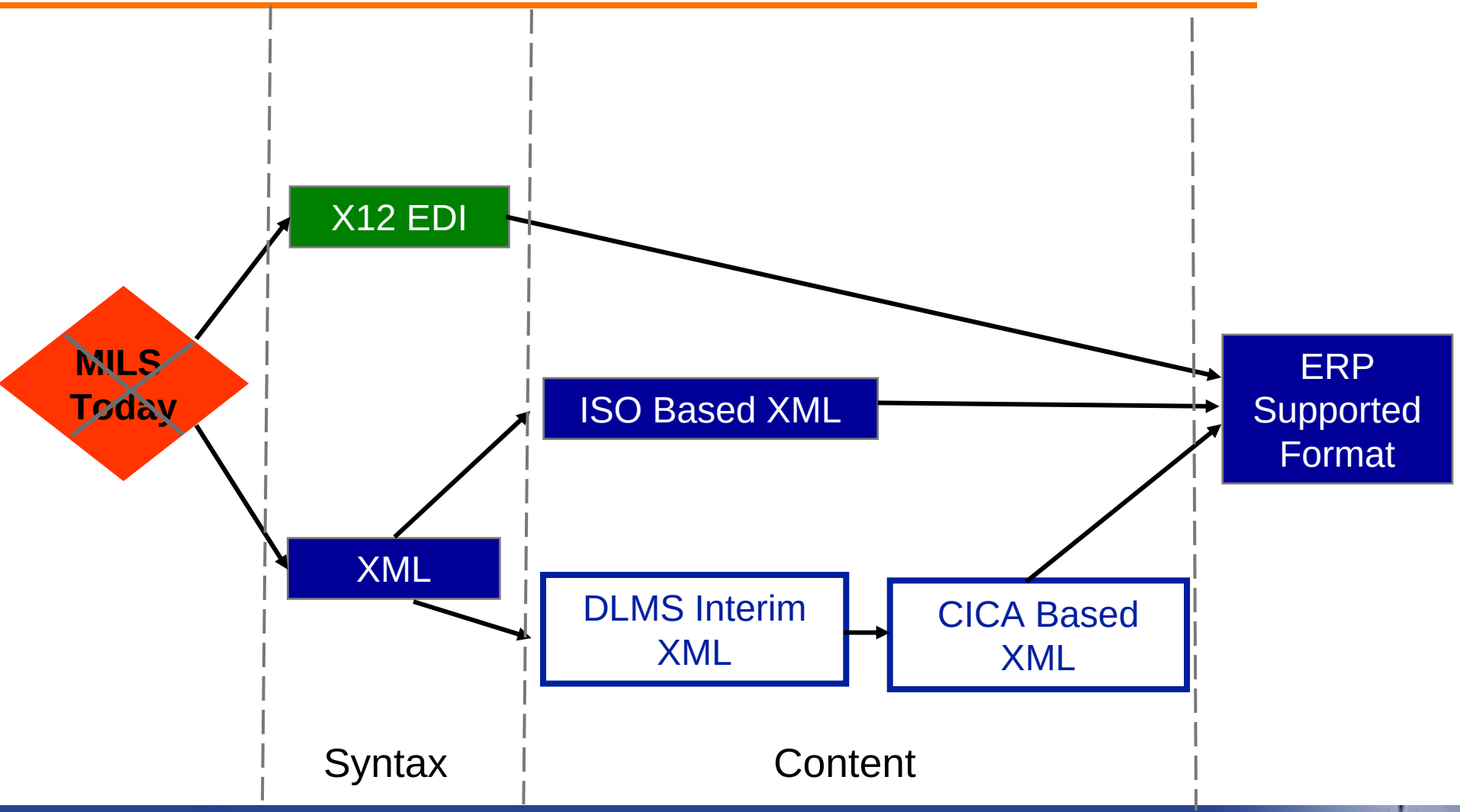
ASC X12 EDI Description

- Managed by the American National Standard Institute's (ANSI) Accredited Standards Committee (ASC) X12
- North American standard
- ASC X12 manages both the technical specification and the business standards
- Variable length format in use for more than 30 years
- Used by almost all of America's largest corporations, but limited penetration into medium and small size companies
- Federal initiatives began in the late 1980's

ASC X12 EDI

- Pros
  - Voluntary consensus standards (VCS) based formats
  - All DLMS EDI transactions have been submitted through and approved by ASC X12
  - Flexible implementation fully compliant with commercial standards, federal and industry EDI practices
  - Architecture in-place
- Cons
  - EDI has a solid presence but is-being/has-been overtaken by net-centric technologies such as XML, and web services
  - Limited to transaction based data exchange
  - S/A's slow to adopt. As of 2003, 95% of DAAS exchanges still MILS
  - Extensive coordination required to meet a broader scope of GCSS
  - Significant drop in corporate participation in ASC X12 (From over 750 to less than 350 in the last 8 years)
    - GSA and DON have dropped their memberships

Army DLMS Migration Path Alternatives



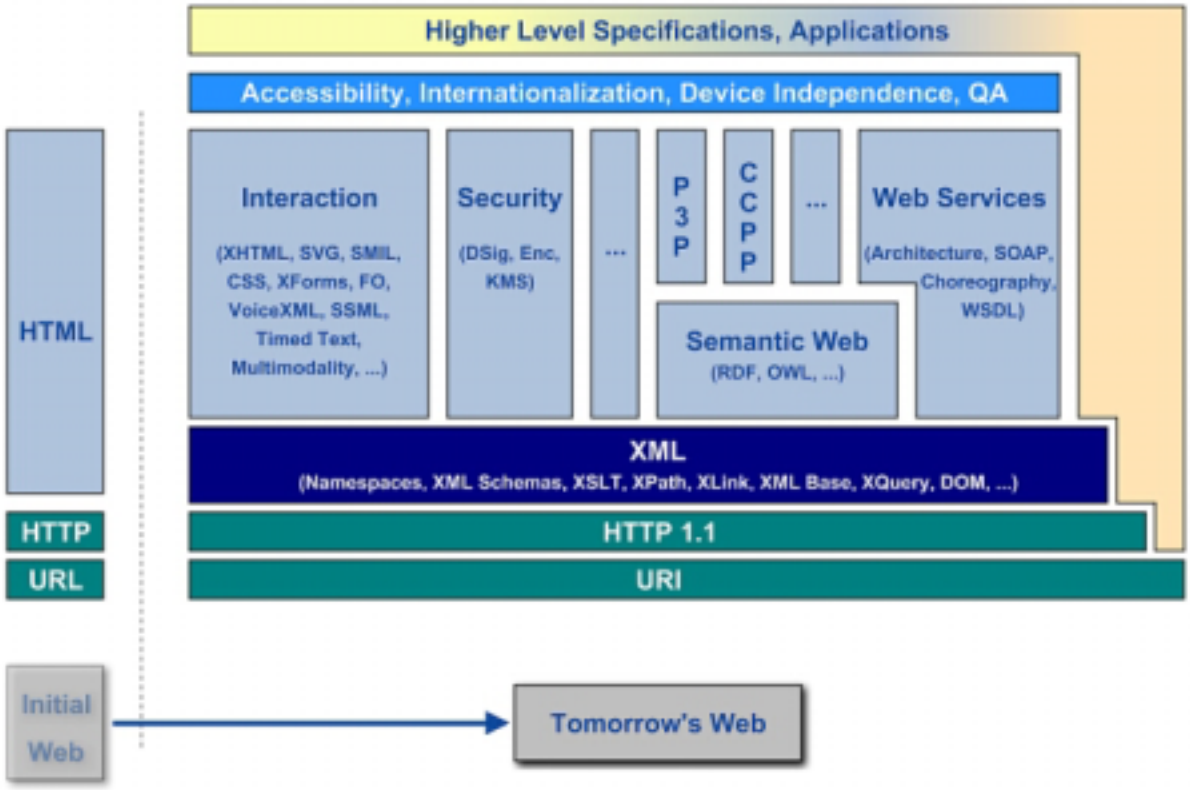
Why Is XML So Important?

“The entire technology industry is replatforming to XML (in the areas of storage, security and management), XML is a lightning bolt from above. It's all about getting connected, We need to make it easier to build applications, and we have to make it easier to connect systems.”

Steve Ballmer, Microsoft CEO

XML: Foundation for the Web-Centric Architecture

- The core technology for the Web
- The enabler for Web Services
- The lynchpin for the Semantic Web
- The basis for all aspects of future computing



XML is not just data tagging

XML Description

- Technical specifications are managed by the World-Wide Web Consortium (W3C) – accepted worldwide.
- First released in 1998
- Functional standards more diverse including ISO, UN/CEFACT, and OASIS
- Variable length mark-up (tagged) language related to SGML and HTML *<PostName>Fort Belvoir</PostName>*
- Unlike prior data exchange formats, XML:
  - Supports data exchange, storage, presentation, and manipulation
  - Specifically designed for web interfaces and applications
  - Drives a series of related standards including those constituting Web-Services
  - Supports data modeling and reusable components
  - Is incorporated into a wide variety of COTS tools ranging from MS XP and Office products to enterprise applications such as SAP

XML Pros and Cons

- Pros
  - The foundation for the Web, will be a key component in Army's net-centric strategy
  - Can be readily adopted across ALL Army systems
  - Is/will be the best exchange format to interact with the largest number of Army trading partners:
    - Large or small
    - Foreign or domestic
    - Internal, other government, industry
    - Web Services, XML, and other related services provide the sophistication and flexibility to support the proposed Army and DoD architecture
  - Consistent with FEA, JTA, and NCES
- Cons
  - Extensibility requires careful management. Semantic (content) layer is not controlled by a single VCS

Industry/Federal use of XML

- Gartner Group
  - "Gartner research indicates that extensible markup language is increasingly being adopted within the financial services industry…Approximately half of the banks and asset managers use XML" – Research Note T-21-2750, Oct. 2003
  - "Since 1998 XML has grown from a little-known standard into a foundation of web-computing infrastructure." – Strategic Analysis Report June 2004, G00120920
- Policy Guidance – DoD Joint Technical Architecture, Federal Enterprise Architecture, Department of Navy, NCES
- Federal Implementations – DLIS, General Services Administration, Core.Gov, Treasury, DoJ, EPA, Small Business Administration, Department of Navy, Army, Integrated Acquisition Environment, Standard Procurement System, Team Regulatory XML and many others

XML in DoD Enterprise Architecture

Net-Centric Enterprise Services (NCES) Technology Development Strategy. Version 2.7, August 2003

> *"There is currently within the commercial marketplace a large migration from proprietary technologies to a set of open standards based capabilities supporting application and information integration based on Extensible Markup Language (XML). … During the technology phase, NCES is piloting services based on these standards and technologies to assess their maturity and capabilities within the DoD environment."*

Joint Technical Architecture Version 6.0, October 2003.

XML identified in:

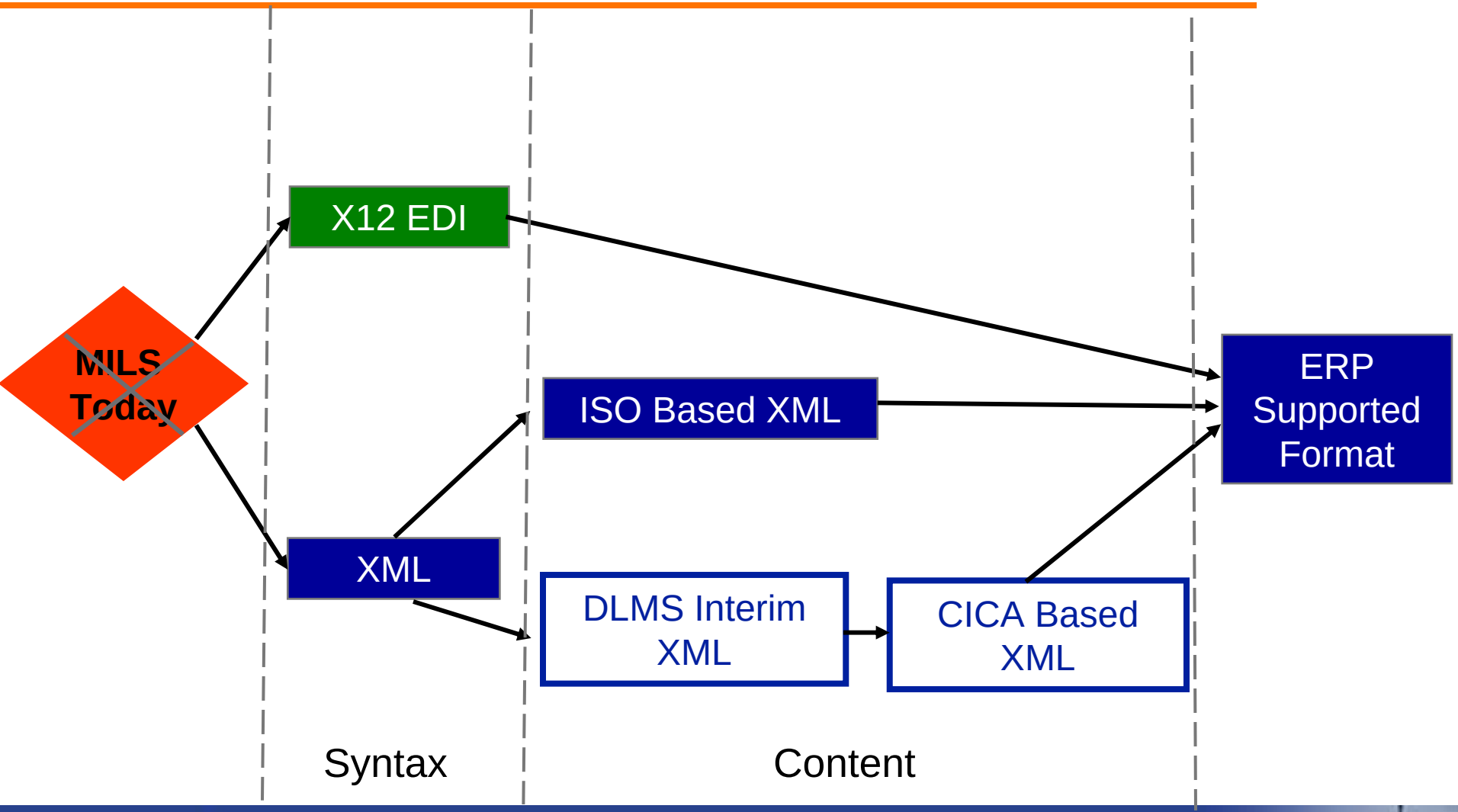
- Section 2.5.4.1 Data Interchange Services
- Section 4 Information Modeling, Metadata, Information Exchange Standards
  - 4.5.3 Unified Modeling Language
  - 4.8 Information Exchange Standards
  - 4.8.2 XML-based Information Exchange

ASC X12 identified in: Section CS.MED: Medical Domain

Syntax Recommendations

- DLMS migration:
  - Systems to be retained
    - Using X12 EDI – continue to use X12
    - Using MILS or other formats – migrate to XML
  - Systems to be consolidated – migrate to XML
  - Systems to be replaced – replacement systems use XML
- Adopt XML as a strategic tool to support interoperability and enterprise integration
- Fully engage SAP capabilities to deploy XML

Army DLMS Migration Path Alternatives



DLMS Interim XML Description

- Series of 54 Schema developed by DLMSO using EDIFECS Specbuilder tool in early 2000's
  - Each Schema corresponds directly to one of the DLMS X12 EDI transaction set implementation conventions
  - Each Schema contains detailed ASC X12 code
  - Initial briefing to S/A's in September 03
- Provides S/A's an XML alternative (beyond ASC X12 EDI) to the DLSS
- DAASC has developed maps for each schema into Mercator EDI translator – enables translation between DLMS EDI and XML formats
- Unlike DLMS X12 EDI, DLMS interim XML was not coordinated with S/As prior to development or submitted to ASC X12 or other standards bodies
- DLMSO envisions DLMS interim XML as a stepping stone to DLMS adoption of ASC X12 CICA-based XML when ready for production

DLMS Interim XML Pros and Cons

- Pros
  - In place and ready to use
  - Contains all data needed for DAAS to convert between DLMS Interim XML and X12 EDI
- Cons
  - Based on proprietary EDIFECS software
  - DoD logistics unique format
  - Only understandable using ASC X12 standards
  - Not standards or FEA based
  - Will require additional transformation software adding complexity and cost to Army systems (e.g., GFEBS)
  - Will be discarded when standards-based solution is implemented
    - DLMSO will completely restructure content and work with ASC X12 to create new Schema
    - Army will have to reconfigure XML processors to handle new formats

DLMS Syntax – Interim XML Bandwidth

Partial Sample of DLMS Interim XML Requisition

```
<E_Quantity_Ordered  EDIDataType="R" ID="330" Name="Quantity
    Ordered">12</E_Quantity_Ordered>
<E_Unit_or_Basis_for_Measurement_Code EDIDataType="ID" ID="355"
    Name="Unit or Basis for Measurement
    Code">EA<E_Unit_or_Basis_for_Measurement_Code>
<E_Product_Service_ID_Qualifier EDIDataType="ID" ID="235"
    Name="Product/Service ID
    Qualifier">FS<E_Product_Service_ID_Qualifier>
<E_Product_Service_ID EDIDataType="AN" ID="234"
    Name="Product/Service ID">4320011234567</E_Product_Service_ID>
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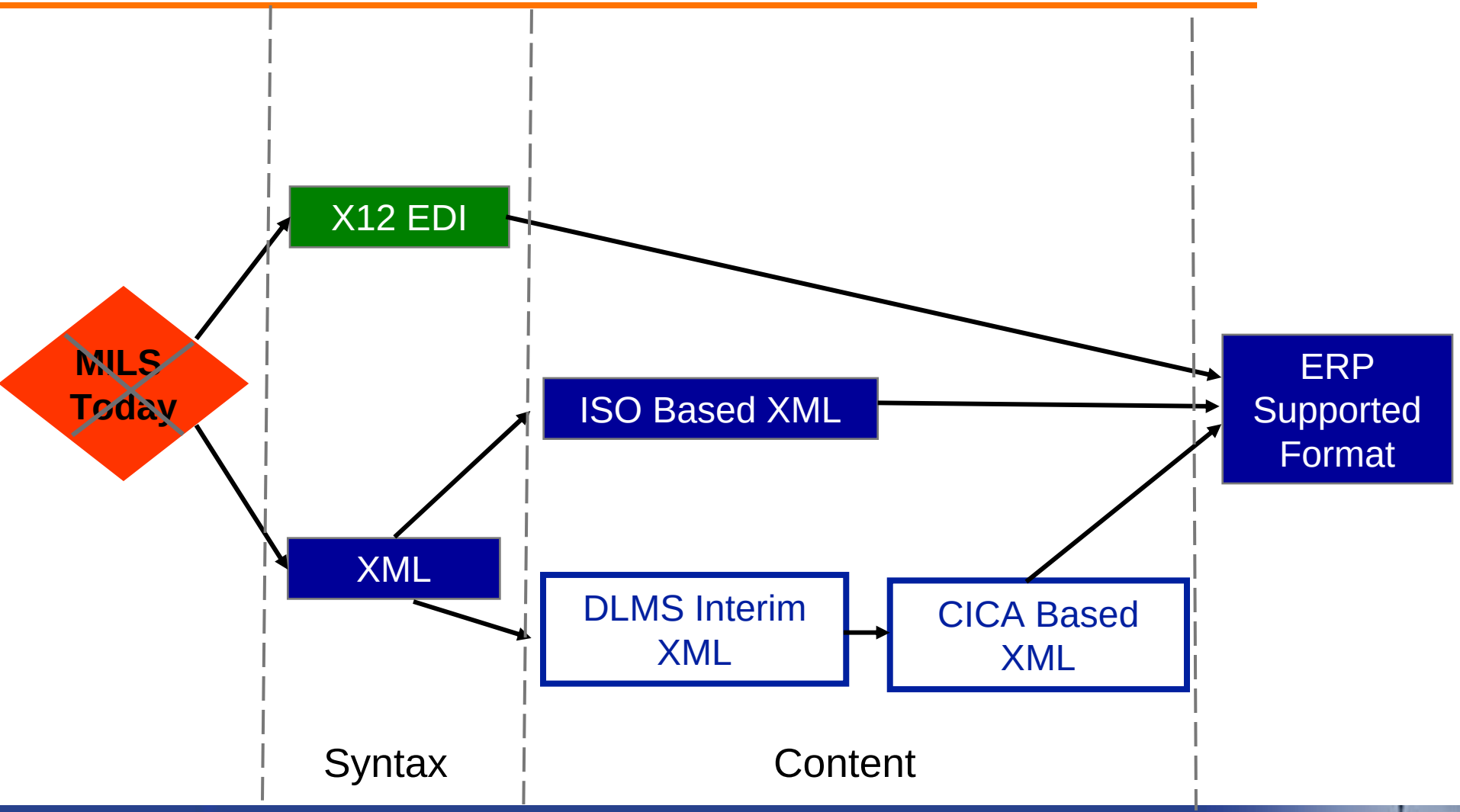
Army DLMS Migration Path Alternatives

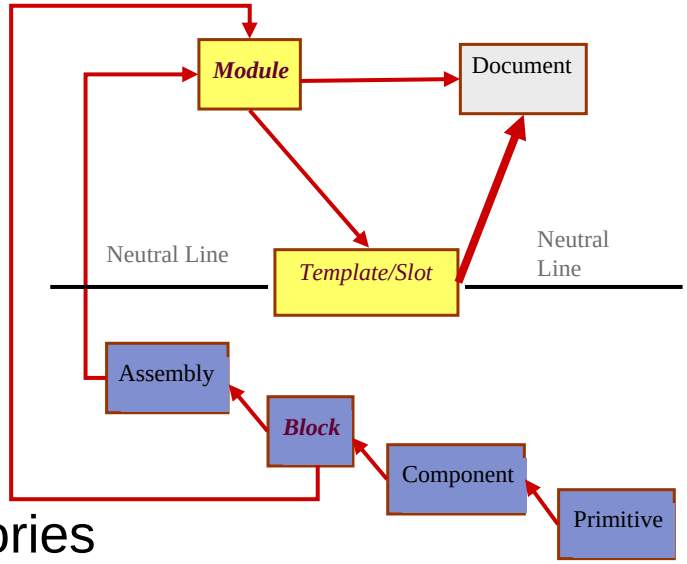


Component Based Solutions

- Traditional information exchange standards such as X12 EDI
  - Are narrowly focused on specific exchange(s)
  - Are not based on solid process analysis
  - Do not seamlessly integrate with internal systems
  - Do not support totality of requirements for manipulation of data
  - Inhibit standardization and reuse of components across communities
  - Mix syntactic and semantic rules
- Component based solutions attempt to address these issues by creating integrated data architectures and data exchange methodologies coupled with comprehensive process modeling
- Components address data element naming, grouping and reusability

ASC X12 CICA Based XML - Description

- Context Inspired Component Architecture (CICA) – standard under development within ASC X12
- Focuses on building <u>messages</u> using XML
- Seven hierarchical levels of granularity
  - Lowest level taken from ISO 15000-5
  - All other levels are X12 unique

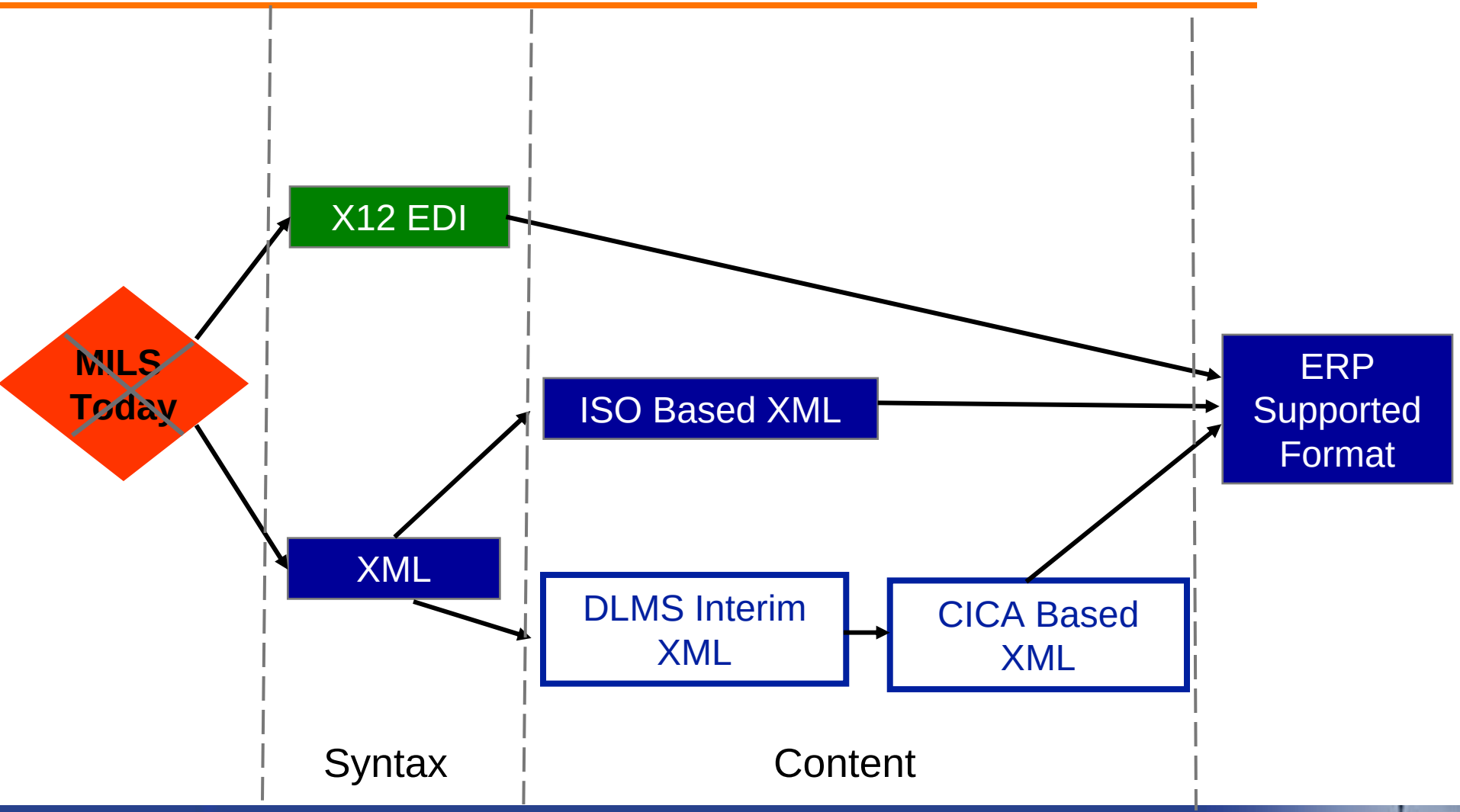


- Context categories use ISO 15000-5 categories
- Uses combined semantic and sequence naming
  - "The dictionary name of the component subclass shall be formed by appending a two digit sequence number to the superclass"
- XML Assembly
  - Black box converting constructs into types and elements

ASC X12 CICA Based XML – Pros and Cons

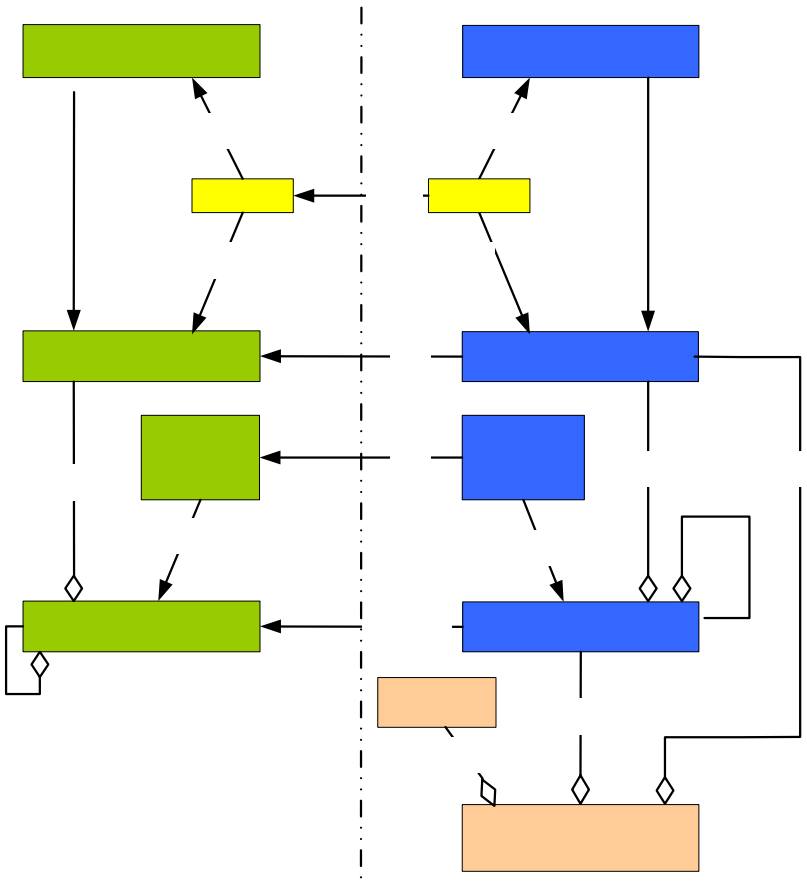
- Pros
  - Provides DLMSO with continuous support from same standards body
  - Creates a reusable components based approach similar in concept but structurally different than ISO based Core Components
- Cons
  - Primarily a North American standard. Not used by coalition partners.
  - Will require complete replacement of existing DLMS Interim XML transactions
  - Not aligned with FEA data reference model (DRM) (not ISO 11179 based)
  - Is not currently incorporated into COTS solutions such as SAP
  - Requires ASC X12 “black box” to write Schema

Army DLMS Migration Path Alternatives



ISO Based XML and CCTS – Description

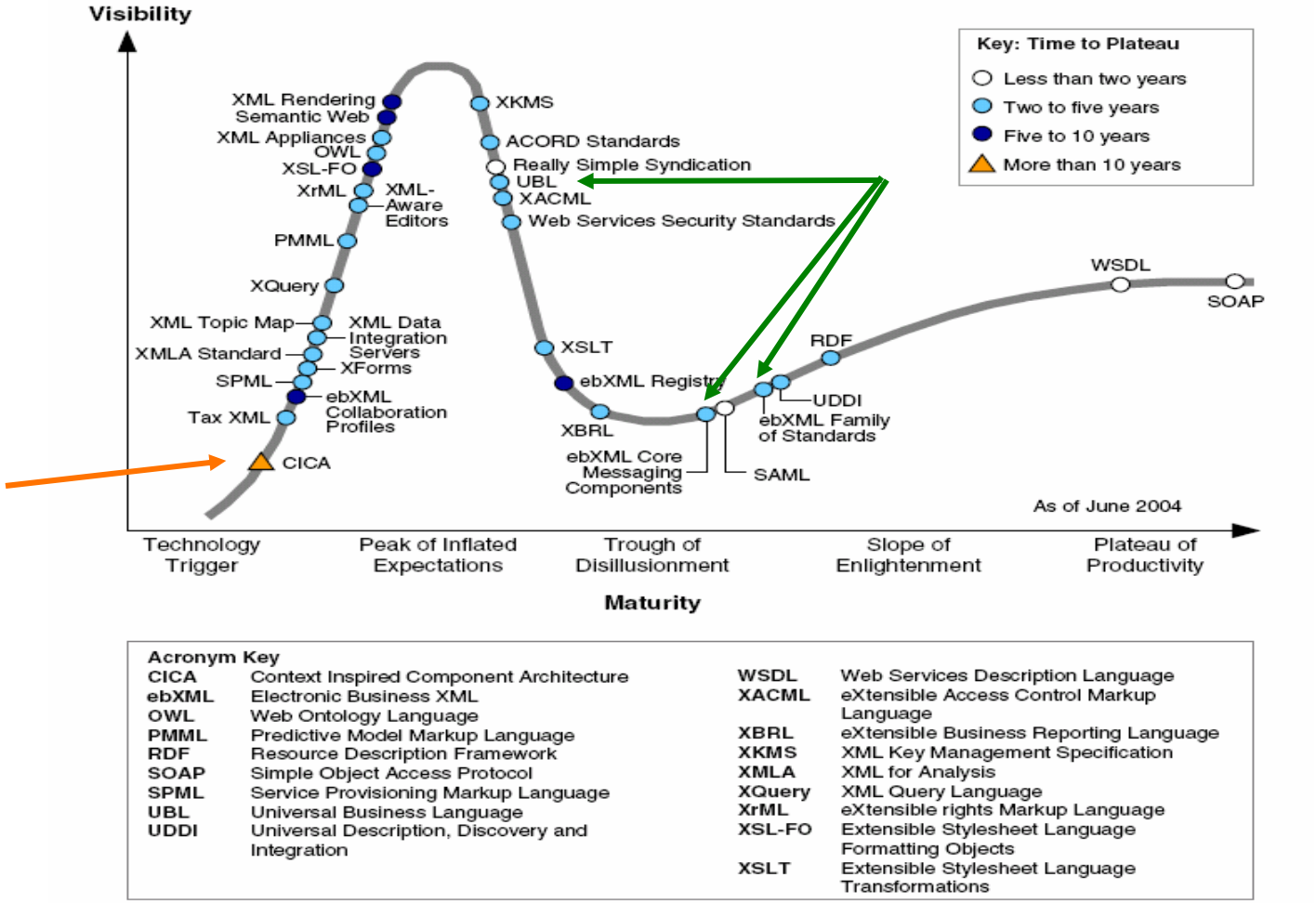
- Three tiered approach to building solid, interoperable XML
  - UN/CEFACT Modelling Methodology (UMM)
    - UML Based UN Standard
  - ISO 15000-5 *Core Components Technical Specification (CCTS): Part 8 of the ebXML Technical Framework* specification for Data Analysis
  - ISO Candidate XML Naming and Design Rules (NDR)
    - UBL and UN/CEFACT to be submitted later this year to ISO Technical Committee 154



ISO XML – Pros and Cons

- Pros
  - Supported in FEA
  - ISO based and used in U.S. and coalition partner governments
  - Mature, proven, and in use
  - Is being incorporated into COTS solutions such as SAP
  - Consistent with modeling and architecture concepts being developed within Army G6
- Cons
  - DLMSO would need to transition staff representation to ISO and UN/CEFACT from ASC X12

CICA & ISO Life Cycles



Acronym Key

CICA	Context Inspired Component Architecture
ebXML	Electronic Business XML
OWL	Web Ontology Language
PMML	Predictive Model Markup Language
RDF	Resource Description Framework
SOAP	Simple Object Access Protocol
SPML	Service Provisioning Markup Language
UBL	Universal Business Language
UDDI	Universal Description, Discovery and Integration
WSDL	Web Services Description Language
XACML	eXtensible Access Control Markup Language
XBRL	eXtensible Business Reporting Language
XKMS	XML Key Management Specification
XMLA	XML for Analysis
XQuery	XML Query Language
XrML	eXtensible rights Markup Language
XSL-FO	Extensible Stylesheet Language Formatting Objects
XSLT	Extensible Stylesheet Language Transformations

Source: Gartner Research (June 2004)

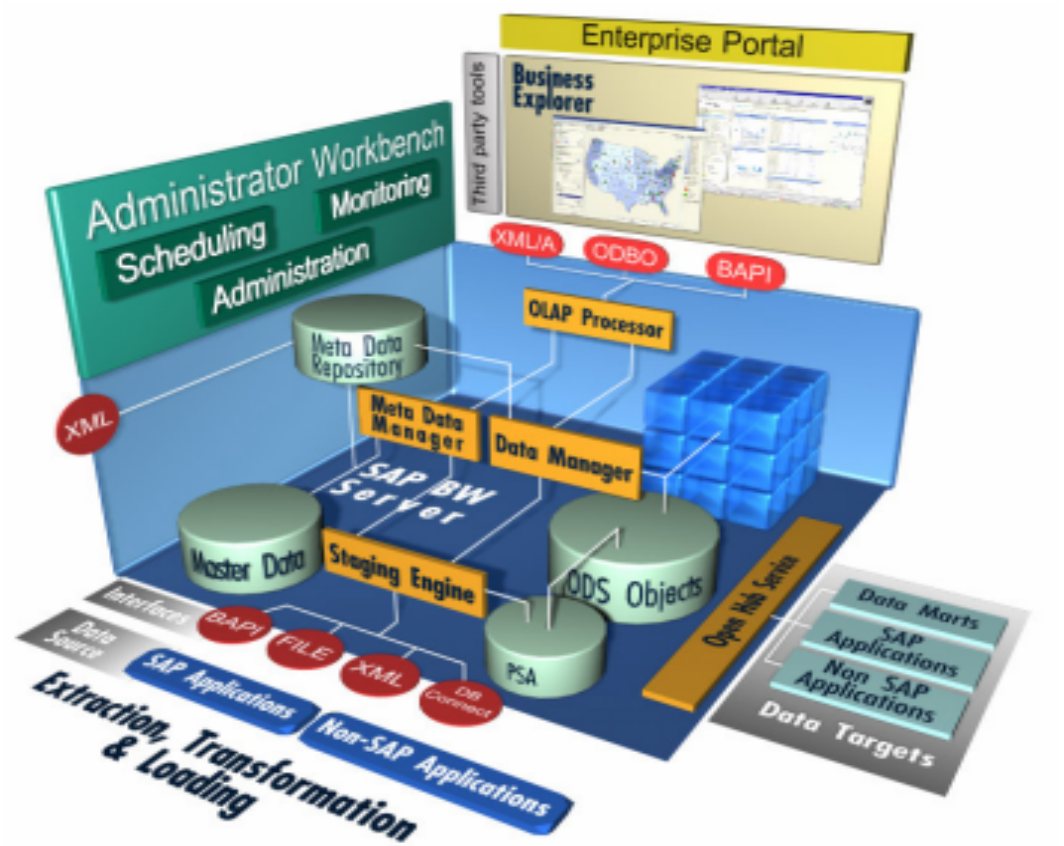
Figure 1. Hype Cycle for XML Technologies, 2004

A Comparison

	ASC X12 CICA Based XML	ISO Based XML
Breadth of Applicability	North American Standard	International
Federal Adoption	DLMSO	Aligned with FEA Data Reference Model
COTS Support for creating Schema	X12 proprietary package	Widely supported
Supporting Standards	Limited ISO 1500-5	ISO 11179 & ISO1500-5
Aligned with Process Modeling	No	Yes – UML/UMM
Syntax Neutral	Partially	Yes
Reusable for Enterprise Data Modeling	No	Yes
Aligned with OO	Partially	Yes
Makes Full use of XML	No – XML limited to exchanges	Yes – including exchanges, storage, manipulation, and presentation

SAP NetWeaver Approach

- SAP – Army's ERP vendor is building next generation ERP system around NetWeaver software
- NetWeaver Master Data Model will be based on ISO 11179 and ISO 15000-5
- NetWeaver XML will be based on ISO XML naming and design rules



Content Recommendations

- Select ISO based XML as its underlying data exchange syntax for all ERP and other system exchanges
- DLMS Migration Strategy
  - Recommend that OSD/DLMSO adopt ISO based XML and core components in DLMS to align with DoD S/A ERP, GCSS and Net-centric solutions
  - Use XSL transformations as necessary where DLMS formatted XML exchanges are required
- If OSD endorses CICA approach find ways to facilitate transition of CICA to international standards-based solution

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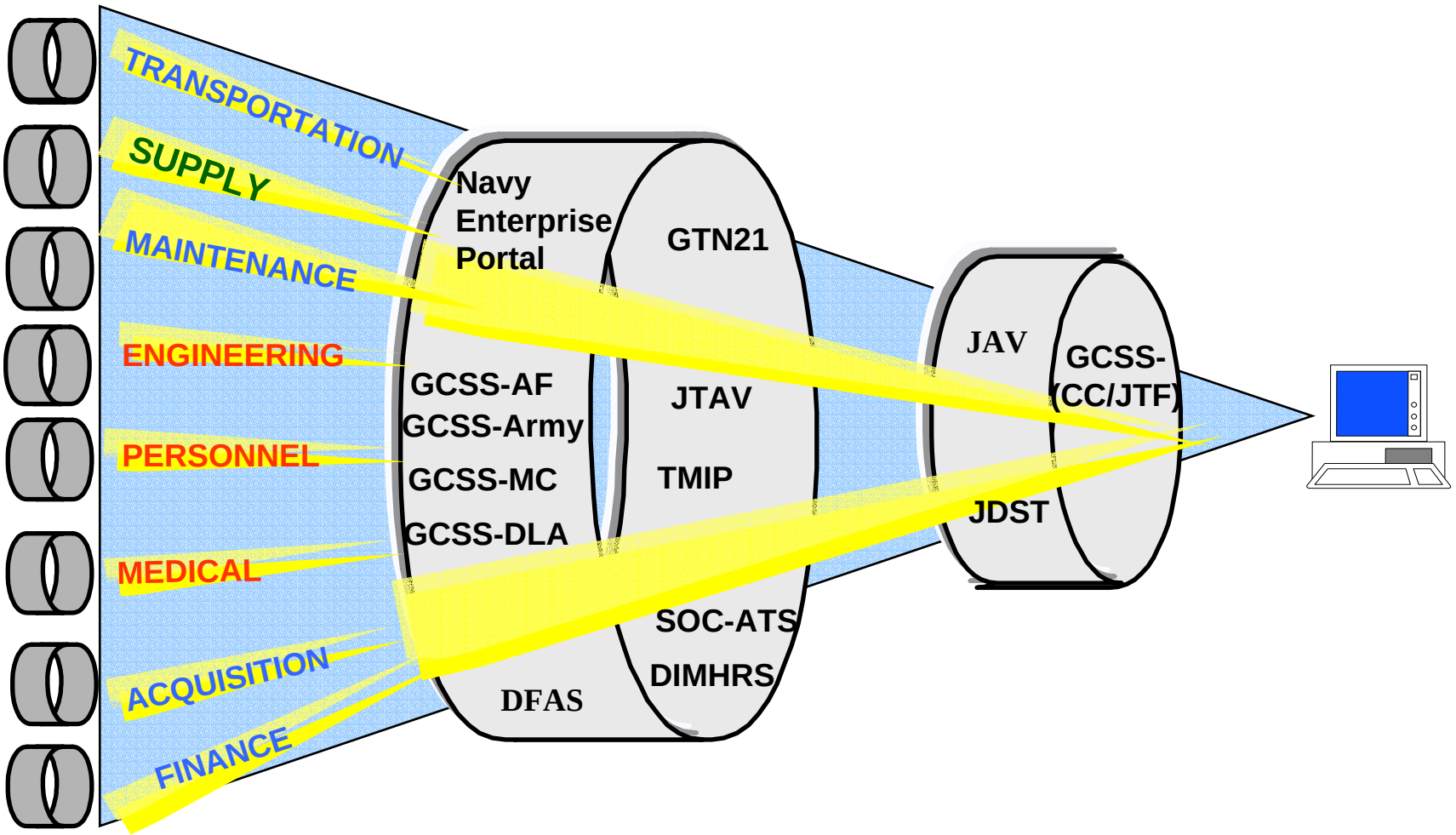
Scope

- DLMS Scope is primarily focused on supply including requisitioning, inventory, billing, and item discrepancy
- Other related functions including acquisition, transportation, and maintenance are largely not represented
- Originally, most S/A systems were aligned with DLSS but have over time diverged. ERP processes may be increasing the gap

Data Integration and DLMS Scope



Scope Recommendations

- Recommend to OSD AT&L that DLMSO lead a joint S/A process to evaluate DLMS expansion that incorporates related logistics functions (e.g. maintenance, transportation, acquisition)
- Formalize data management approaches across the Army using consistent web-centric approach
  - Army internal and external
  - DLMS and non-DLMS
  - Transaction and Web-Service based

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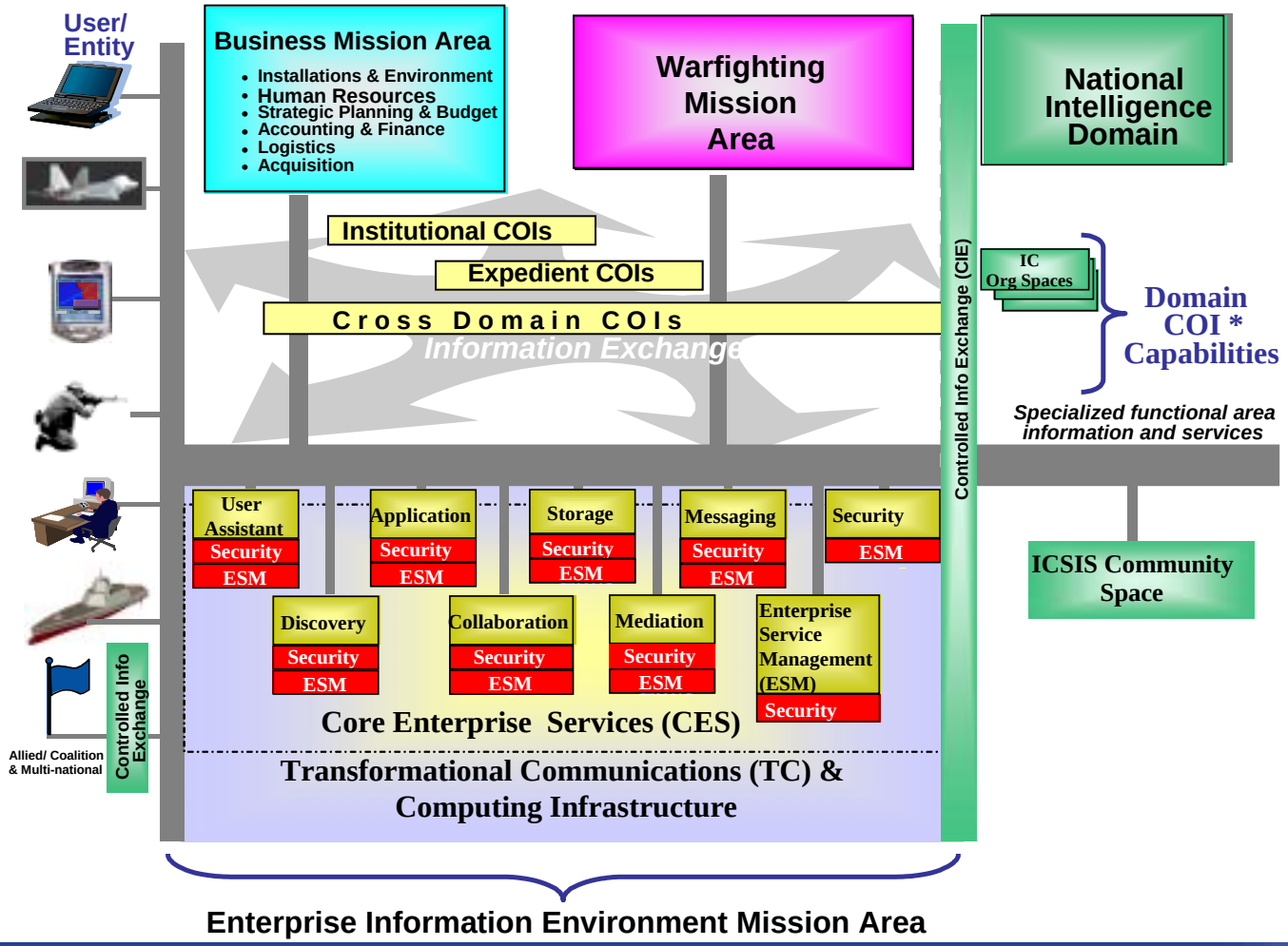
GAO Study Results - Interoperability

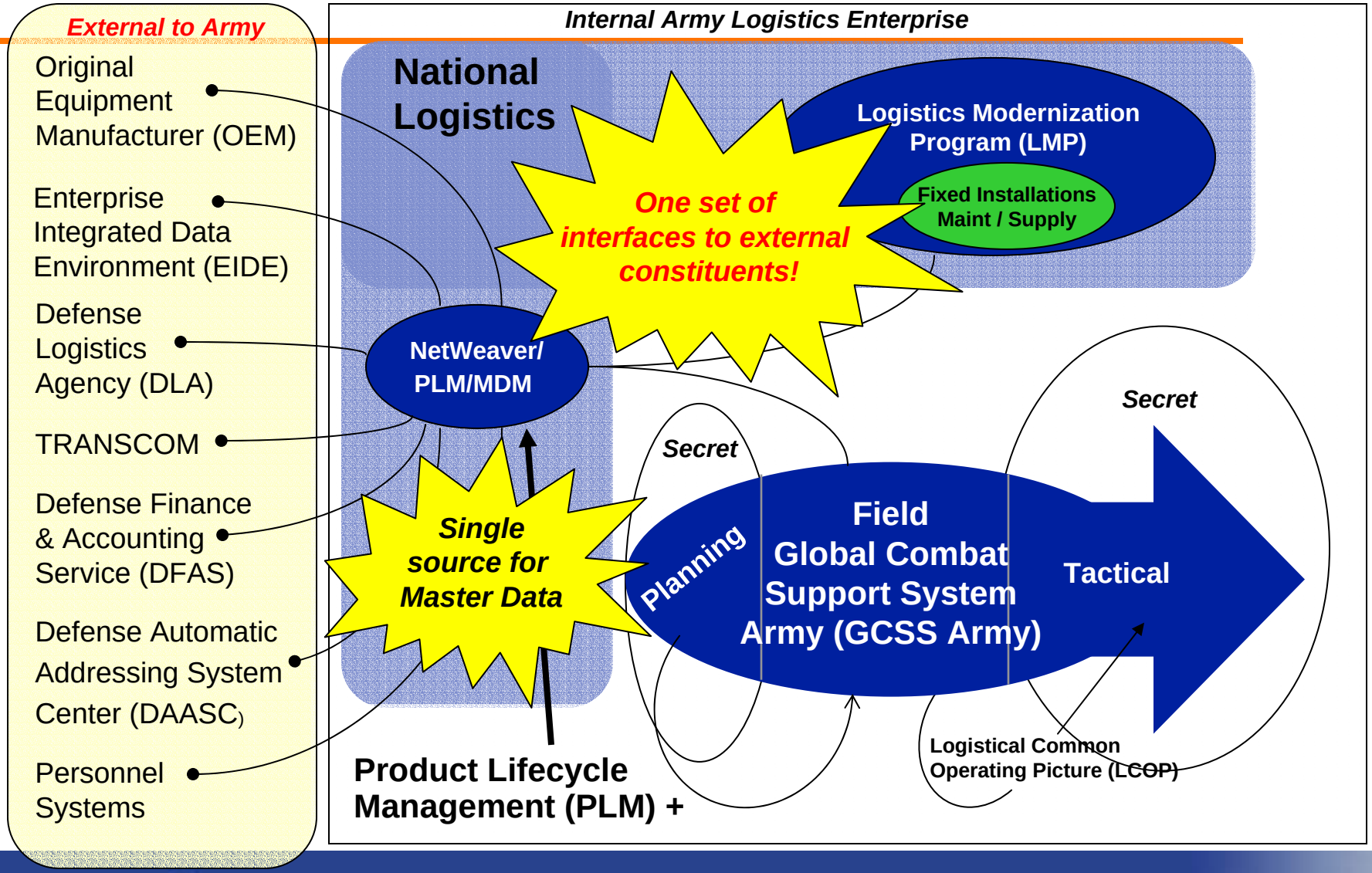
- If not implemented in the context of an enterprise architecture, XML is likely to provide only a patchwork solution to systems interoperability
  - Data element definitions and structures are likely to overlap in function or be completely redundant
  - Potential for proprietary extensions to be built into systems that would defeat XML's goal of broad interoperability
- Broader gains in interoperability require a greater upfront commitment to address … standards issues

August 2004 – DLA releases RFP to develop an EA consistent with OMB and DoD architectures to deliver IT as enterprise services, and enable transformational initiatives. Systems include BSM, IDE, and PDMI

Net-Centric Enterprise Services (NCES)



High Level Logistics System Architecture Overview



DLMS Architecture - Issues

- Inconsistent with other DoD initiatives
  - Not Web-centric
  - Not enterprise service based
  - Not flexible
- Does not support end-to-end exchanges of untransformed data
- Causes both DoD and trading partners to support additional logistic unique process
- Limits effectiveness of built-in XML capabilities of many COTS products as well as stand-alone tools
- Limits effectiveness of ERP products
  - Army, DON and others moving to ERPs
  - SAP supports built-in XML exchanges, but does not natively support EDI
    - ✓ Requires middleware to generate/process EDI
    - ✓ Each SAP instance may require a different map

DLMS Architecture – Recommendations

Army should recommend OSD AT&L initiate a DLMS architecture planning effort to include

- Organizations
  - OSD
    - AT&L - DAASC/DLMSO
    - NII/DISA
  - DoD Services and Agencies
  - Key non-DoD users including Federal level input
- Framework
  - Planning window, 2005-2015
  - ERP and other COTS software capabilities
  - New standards such as Web-Services and Registry Repositories
  - DoD initiatives and policies including GIG, NCES, and forthcoming Metadata policy

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Supporting the Warfighter through Holistic IT Solutions

"The Army, ***together with the joint community***, must relentlessly address the architectures, protocols, and systems of a redundant, ***non-terrestrial*** network capable of providing the focused bandwidth necessary to support mobile Battle Command and joint Blue Force Tracking."

Acting Secretary of the Army/Army Chief of Staff White Paper
http://www.carlisle.army.mil/usawc/parameters/04summer/schoomak.htm

Recommendations – Army Internal Actions for DLMS

- Incorporate recommendations into Army DLMS migration strategy
  - Syntax
    - Systems to be retained
      - Using X12 EDI – continue to use X12
      - Using MILS or other formats – migrate to XML
    - Systems to be consolidated – migrate to XML
    - Systems to be replaced – replacement systems use XML
  - Content
    - Select ISO based XML as its underlying data exchange syntax for all ERP and other system exchanges
    - Use XSL transformations as necessary where DLMS formatted XML exchanges are required
    - If OSD endorses CICA approach, find ways to facilitate transition of CICA to international standards-based solution

Recommendations – Army Internal Actions Beyond DLMS

- Syntax
  - Adopt XML as a strategic tool to support interoperability and enterprise integration
  - Fully engage SAP capabilities to deploy XML
- Scope
  - Formalize data management approaches across the Army using consistent web-centric approach
    - Army internal and external
    - DLMS and non-DLMS
    - Transaction and Web-Service based
- Governance
  - Develop XML policy
  - Develop XML governance policy

Recommendations – External Actions

- Recommend to OSD AT&L
  - DLMSO adopt ISO based XML and core components in DLMS to align with DoD S/A ERP, GCSS and Net-centric solutions
  - DLMSO lead a joint S/A process to evaluate DLMS expansion that incorporates related logistics functions (e.g. maintenance, transportation, acquisition)
  - Initiate a DLMS architecture planning effort
    - Organizations: OSD AT&L and NII, DoD S/As, key non-DoD users including federal level input
    - Framework
      - Planning window, 2005-2015
      - ERP and other COTS software capabilities
      - New standards such as Web-Services and Registry Repositories
      - DoD initiatives and policies including GIG, NCES, and forthcoming Metadata policy

Army DLMS Migration Strategy
September 1, 2004

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